

MagneX™ Single-Phase Interrupter

GENERAL

The Cooper Power Systems MagneX™ Interrupter is an overcurrent protective device that protects distribution transformers from damaging overloads and secondary faults, and is also used for switching the transformer “on” or “off”. As a transformer protective device, the MagneX Interrupter combines safety and efficiency with economic operation.

It is an integral assembly, which does not use a troublesome linkage or require calibration, making installation and operation fast and trouble free.

The housing is made of an ultraviolet stabilized, high strength glass-filled thermoplastic material. The operating shaft is sealed against leakage with a double-Viton® O-ring seal.

APPLICATION

The single-phase MagneX Interrupter combines the functionality of one Bay-O-Net fuse and one single-phase on/off Loadbreak switch in one protective device. This allows transformer manufactures more flexibility in application of the product and potentially reduces the space required to install the device on the transformer front plate. This product is ideal for single-phase pad- and pole-mounted transformer applications.

Secondary faults and overloads will trip the MagneX Interrupter “OPEN”; however, the device can be reset once the condition is corrected.

Primary faults are cleared by the MagneX Interrupter in coordination with either an isolation link or current-limiting fuse.

The MagneX Interrupter can be ordered with an optional Emergency Overload EO feature. When the transformer is tripped due to overloading, the EO feature can allow an additional 30% loading to quickly restore service. Losses with the MagneX Interrupter during normal and overload conditions are negligible compared to those of a secondary breaker. (Refer to Table 5.)

The MagneX Interrupter can also be



Figure 1. MagneX Interrupter with standard handle, indicator, and emergency overload (EO) options.

Note: EO is disabled, i.e. in the normal position.

used as a primary switch to disconnect the transformer windings — not just the load. This eliminates core (no load) losses on transformers not in service. Residual voltage problems associated with secondary breakers during banking of transformers are also eliminated.

Optional Handle Assemblies

A standard handle, as shown in Figure 3, is typically used in overhead poletype transformers. If operating space is available it is also used in underground padmount transformer applications. It is made of an ultraviolet stabilized, high strength glass-filled thermoplastic material. The lower slotted portion of the handle is made of a flexible ultraviolet stabilized elastomeric material. The handle requires five pounds of force to operate manually. It allows flexibility during excessive force during operation.

An optional hotstick adaptor as shown in Figure 4, is used in underground padmount transformer applications. It allows for hotstick operation directly

without requiring wide arc angles in cabinets where operating space is limited due to cable training and other components.

Optional Indicator

An optional indicator as shown in Figure 4 is used to indicate that the MagneX has tripped due to an overload condition or a secondary fault. During normal conditions, the indicator lens is clear. When the MagneX has tripped, a highly visible orange fluorescent flag appears in the lens area. The clear lens is made of Xylex™ giving the exposed lens a tamperproof, and scratch-resistant protection. When the MagneX is reset, the lens becomes clear again.

INSTALLATION

The MagneX Interrupter is mounted under-oil in the primary side of the transformer. No special tools are required. The MagneX assembly is mounted through the transformer wall. The incoming high voltage lead is connected to the isolation link on the MagneX, or to the current-limiting fuse

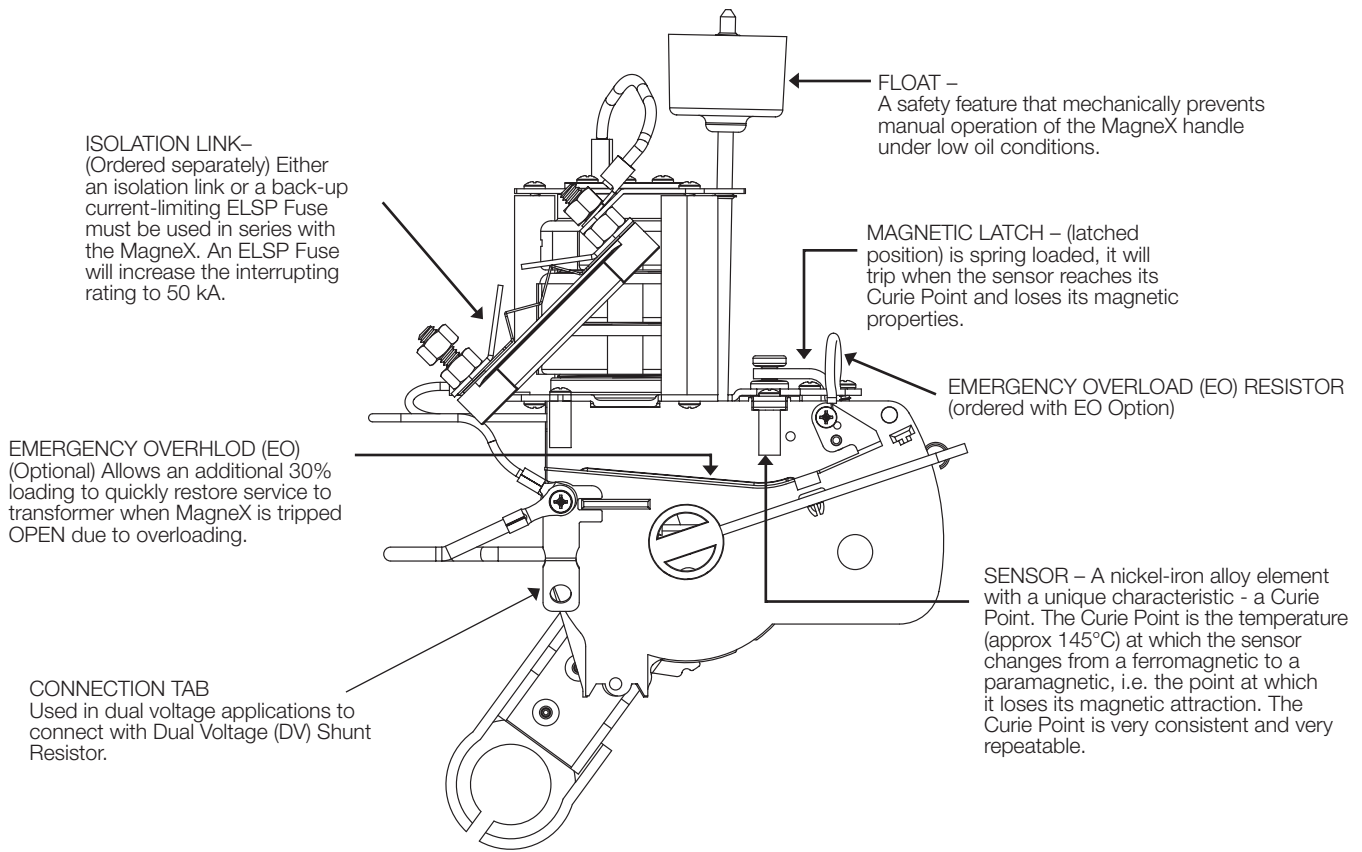


Figure 2.
MagneX Interrupter - Back View.

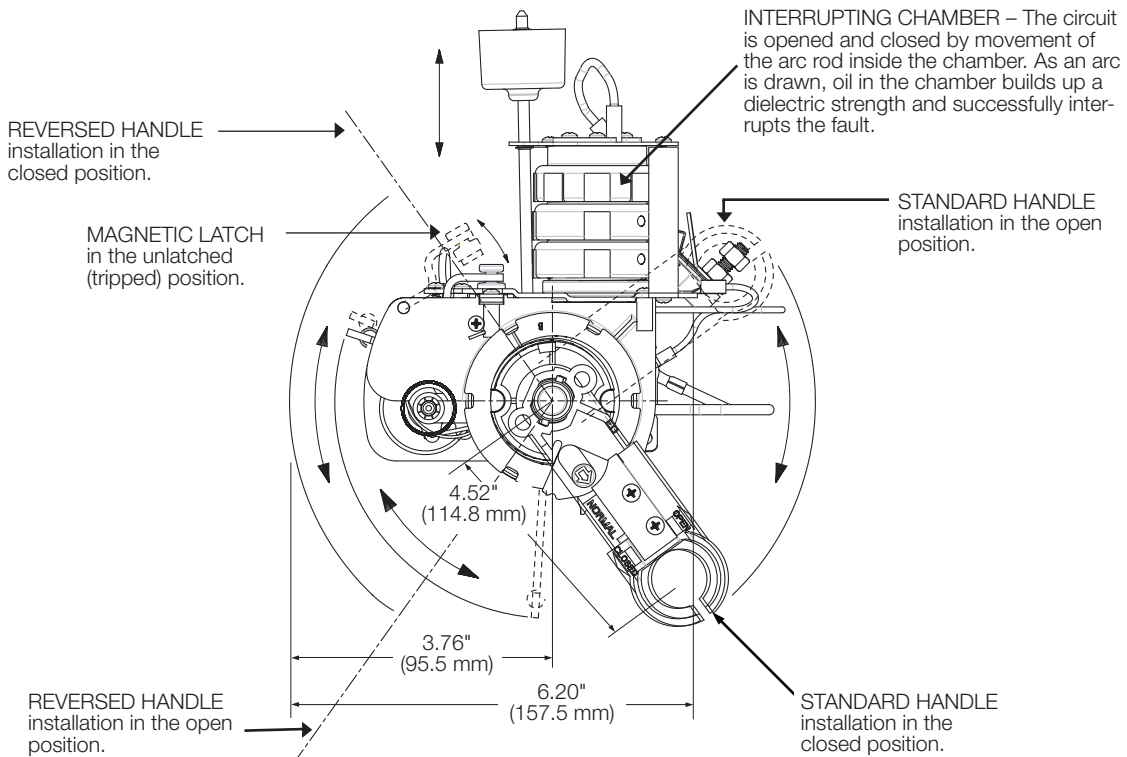


Figure 3.
MagneX Interrupter showing handle swing - Front View with Standard Handle.

Note: Dimensions given are for reference only. See ordering information on Page 4.

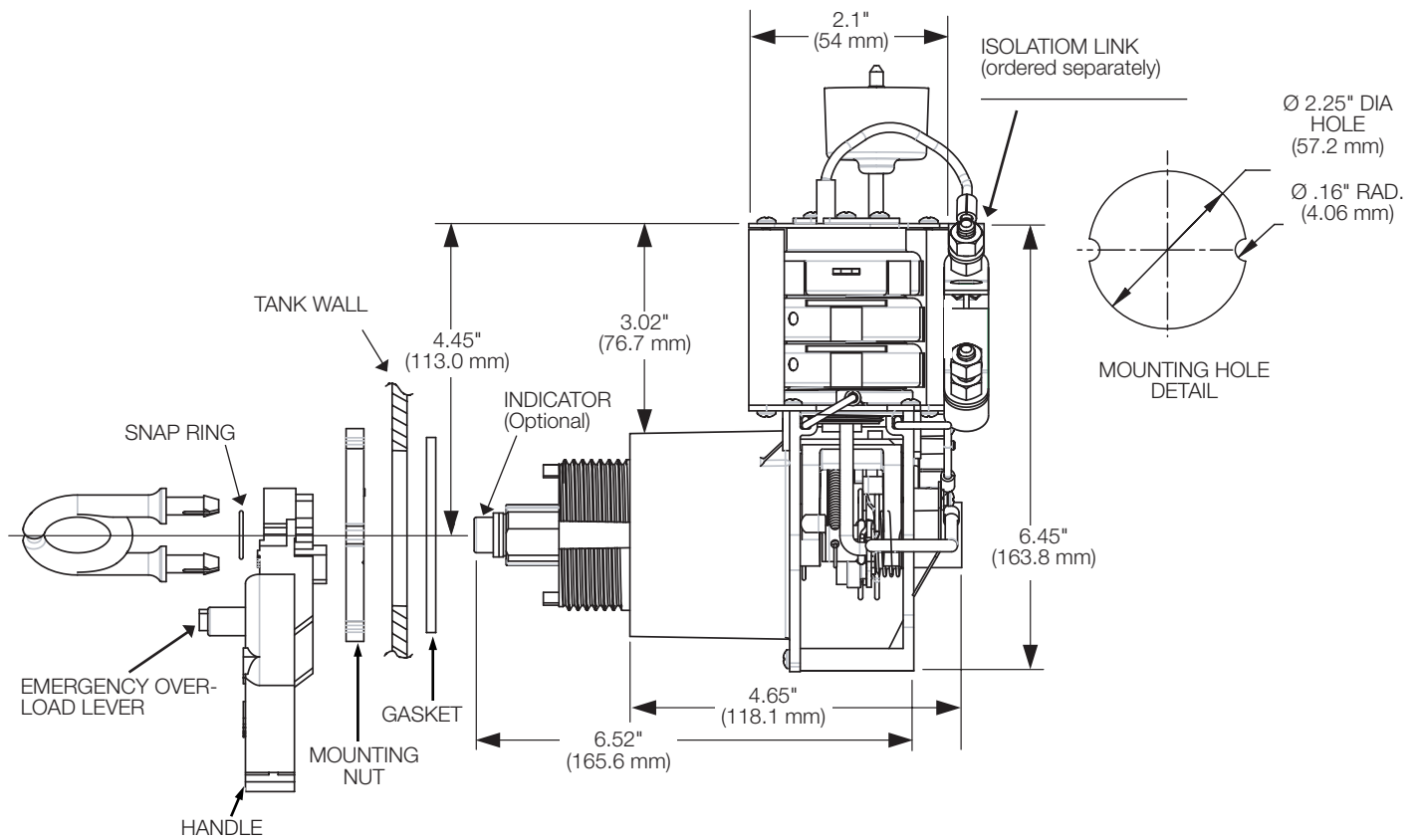


Figure 4.
Side View with optional hotstick adaptor, handle and mounting hole detail.

Note: Dimensions given are for reference only, inches (mm).



Figure 5.
Reversed installation of the handle in the OPEN position.



Figure 6.
Reversed installation of the handle in the CLOSED position.

and then to the MagneX. The coil lead is then connected to the other MagneX lead. Refer to Installation Instructions S240-34-1 for details.

PRODUCTION TESTS

Tests are conducted in accordance with Cooper Power Systems requirements.

- Physical inspection
- Electrically tested to meet Minimum Trip and Maximum Trip Clear TCC Curves
- Periodic Fluoroscopic Analysis (X-ray)

TABLE 1
Voltage Ratings and Characteristics

Description	Rating
Impulse 1.2x50 Microsecond Wave	150 kV
60 Hz-1 Minute Voltage Withstand	50 kV
Continuous Current Rating	42 A
Switching Load Currents, 200 Times	42 A
Magnetizing Current Switching	200 Times

Continuous current ratings and dielectric testing are in accordance with ANSI® Standard C57.12. Switching and Fault Close ANSI® C57.41. Overload Protection ANSI® C57.91.

TABLE 2
Interrupting Rating

Voltage kV-LG	RMS Symmetric (A)	RMS Asymmetric (A)
8.3	2800	4200
15.5	1500	2250
23.0	500	750

ORDERING INFORMATION

MagneX Interrupter

Use Table 6 to determine the correct MagneX Interrupter suffix (sensor number) for the application.

Use Table 3 to determine the catalog number.

When ordering a MagneX Interrupter with a standard handle, a hardware kit must be ordered separately. Use Table 7 to determine the hardware kit catalog number.

To select the correct isolation link, use Table 4 to cross reference the isolation link to the selected MagneX Interrupter.

An isolation link is recommended if the MagneX is not in series with a current-limiting fuse.

TABLE 3
MagneX Significant Digit Catalog Number System

Example: To order a single-phase MagneX Interrupter without indicator, single-phase trip, with float and E12 sensor, the catalog number would be **MX1BN1SYE12**

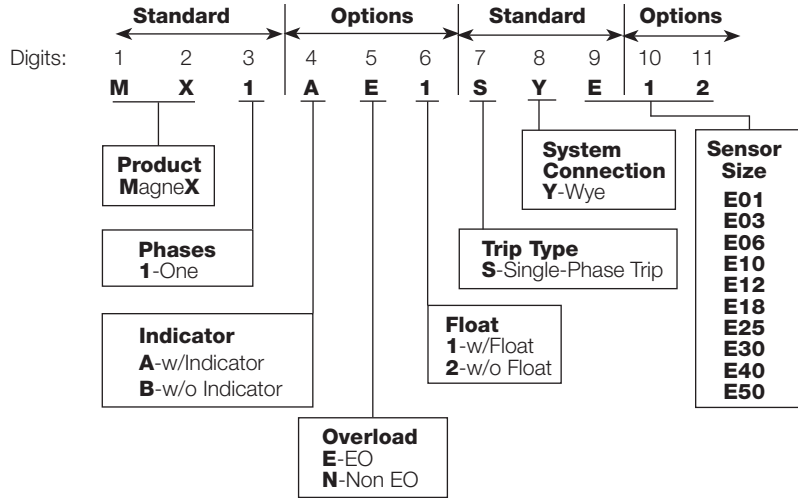


Figure 7
MagneX with hotstick adaptor and indicator.

TABLE 4
Isolation Link – MagneX Correlation Chart

Sensor Number	Isolation Link
E01	3637803B01
E03	3637803B08
E06	3637803B02
E10	3637803B09
E12	3637803B10
E18	3637803B03
E25	3637803B03
E30	3637803B05
E40	3637803B05
E50	3637803B05

TABLE 5
MagneX Interrupter Losses for Single-Phase Transformer (Phase-to-Ground) Applications (WATTS)

Primary Voltage kV											
kVA/kV	2.4	4.16	4.8	6.9	7.2	7.62-7.97	8.32	12.00	12.47-13.2	13.8-14.4	19.92
10	1.32	0.44	0.90	0.43	0.40	0.36	0.30	0.46	0.43	0.35	0.17
15	1.66	0.99	0.74	0.98	0.90	0.80	0.67	0.32	0.30	0.24	0.38
25	2.13	1.53	1.15	1.00	0.92	0.82	0.69	0.90	0.83	0.68	0.33
37.5	4.64	1.59	2.21	1.25	1.15	1.03	0.86	0.74	0.69	0.56	0.73
50	8.25	2.83	2.13	1.90	1.75	1.56	1.53	1.32	1.22	1.00	0.48
75	15.14	6.18	4.64	2.32	2.13	1.90	1.59	1.66	1.53	1.25	1.08
100	-	9.13	8.25	3.99	3.67	3.27	2.83	2.51	2.33	1.90	1.07
167	-	-	18.76	9.26	8.50	9.13	7.65	3.80	3.52	2.87	2.54

Notes:

Losses are calculated at operating voltage for typical Magnex protected transformers at room temperature (25°C) using the selected element in the Correlation Chart, Table 6.

TABLE 6
Single-Phase Transformer (Phase-to-Ground) Applications Correlation Chart

Primary Voltage kV											
kVA/kV	2.4	4.16	4.8	6.9	7.2	7.62-7.97	8.32	12.00	12.47-13.2	13.8-14.4	19.92
10	E06	E06	E03	E03	E03	E03	E03	E01	E01	E01	E01
15	E10	E06	E06	E03	E03	E03	E03	E03	E03	E03	E01
25	E18	E10	E10	E06	E06	E06	E06	E03	E03	E03	E03
37.5	E25	E18	E12	E10	E10	E10	E10	E06	E06	E06	E03
50	E30	E18	E18	E12	E12	E12	E10	E06	E06	E06	E06
75	E50	E30	E25	E18	E18	E18	E18	E10	E10	E10	E06
100	-	E40	E30	E25	E25	E25	E18	E12	E12	E12	E10
167	-	-	E50	E40	E40	E30	E30	E18	E18	E18	E12

Notes:

Recommendations are based on:

- Minimum trip curves, and Maximum trip and clear curves, R240-91-310.
- Deration factor of 0.5% per °C above 25 °C.
- Allowable loading greater than 140% for four hours in accordance with ANSI/IEEE Standard C57.91.1981™ Guide for Loading Distribution Transformers, Table 6.

MagneX with Current-Limiting Fuse

To order a MagneX Interrupter and current-limiting fuse combination, see Table 8.

TABLE 7
Hardware Kits

Description	Catalog Number
Without emergency overload	3638535A04
With emergency overload	3638535A05
With adaptor without emergency overload	3638535A07
With adaptor with emergency overload	3638535A08
Hotstick adaptor only	3639585A01

Example – MagneX Interrupter with an emergency overload, indicator, and a float in series with an ELSP Current-Limiting Fuse for a single-phase, 7.2 kV phase-to-ground, 25 kVA transformer, specify:

1 – 40 A ELSP Fuse 3543040M61M

1 – MagneX Interrupter MX1AE1SYE06

1 – Hardware Kit (with Emergency Overload, indicator, and no adaptor) 3638535A05

See the following Catalog Sections for further information:

ELSP Fuse Holder 240-53

ELSP Current-Limiting Backup Fuse 240-50

Using TCC Curves

To determine or confirm the MagneX Interrupter will coordinate with upstream and down stream system requirements, use the time-current characteristic curves (See R240-91-310). For full size TCC curves, contact your Cooper Power Systems representative.

TABLE 8
Recommended MagneX Interrupter and ELSP Current-Limiting Fuse Combinations

Nominal Single Phase (kV Phase-to-ground)	8.3 kV							15.5 kV			23 kV
	2.4	4.16	4.8	6.9	7.2	7.62-7.97	8.32	12.0-13.2	12.47	13.8-14.4	19.92
10 kVA ELSP Rating MagneX Element	40 E06	40 E06	30 E03	30 E03	30 E03	30 E03	30 E03	30 E01	30 E01	30 E01	30 E01
15 kVA ELSP Rating MagneX Element	50 E10	40 E06	40 E06	30 E03	30 E03	30 E03	30 E03	30 E03	30 E03	30 E03	30 E01
25 kVA ELSP Rating MagneX Element	100 E18	50 E10	50 E10	40 E06	40 E06	40 E06	40 E06	30 E03	30 E03	30 E03	30 E03
37.5 kVA ELSP Rating MagneX Element	125 E25	100 E18	65 E12	50 E10	50 E10	50 E10	50 E10	40 E06	40 E06	40 E06	30 E03
50 kVA ELSP Rating MagneX Element	150 E30	100 E18	100 E18	65 E12	65 E12	65 E12	50 E10	40 E06	40 E06	40 E06	40 E06
75 kVA ELSP Rating MagneX Element	165 E50	150 E30	125 E25	100 E18	100 E18	100 E18	100 E18	50 E10	50 E10	50 E10	40 E06
100 kVA ELSP Rating MagneX Element	—	150 E40	150 E30	125 E25	125 E25	125 E25	100 E18	65 E12	65 E12	65 E12	50 E10
167 kVA ELSP Rating MagneX Element	—	—	165 E50	150 E40	150 E40	150 E30	150 E30	100 E18	100 E18	100 E18	65 E12

Note:

Table shows minimum recommended ELSP Fuse ratings. Recommended ELSP Backup Fuse (described in Catalog Section 240-50) will coordinate with the MagneX Interrupter and melt on internal transformer faults. The MagneX Interrupter recommendations are based on:

- Minimum trip curves, and Maximum trip and clear curves R240-91-310.
- Deration factor of 0.5% per °C above 25°C.
- Allowable loading greater than 140% for four hours in accordance with **ANSI®/IEEE Standard C57.91-1981™** guide for Loading Distribution Transformers, Table 6.
- 30, 40, 50 and 65 A ELSP Fuses are the “Mini” Configuration (I.E. 354_ _ _ M61M Series).
- All coordinations are based on latest vintage ELSP designs. Catalog numbers for fuses larger than 65 A have M71M suffix, 3543_ _ _M71M for 8.3 kV

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